

Rotation Lab on Elements, Compounds and Mixtures

Background:

Everything on this planet is either an element, a compound or a mixture. An element is a substance, which cannot be further divided by chemical methods. They are the building blocks of all chemical compounds. There are 112 elements; 91 of them are naturally occurring, and the rest are man made. Compounds, in contrast, are composed of two or more elements, and thus contain two or more kinds of atoms. Most of the matter we encounter consists of mixtures of different substances. Mixtures are combinations of two or more substances in which each substance retains its own chemical identity and hence its own properties.

This lab will help show the differences between elements, compounds and mixtures by having the students compare 32 different substances and decide whether it is an element, a compound or a mixture. The students will be able to make this determination based on the substances chemical formula or lack of chemical formula. On the card for each substance is listed its chemical symbol or formula. The substances with no chemical formula are the mixtures, the rest are elements or compounds.

Materials:

32 vials containing various substances
A card for each substance

Procedure:

Each student will fill out the sheet titled Rotation Lab on Elements, Compounds and Mixtures. The students are to examine all 32 vials and decide whether each is an element, compound or mixture. They will also write the color and phase of each substance.

Rotation Lab on Elements, Compounds and Mixtures

	Name of Substance	Symbol or formula	Color	Phase (Check one)			Type (Check One)		
				S	L	G	E	M	C
1.									
2.									
3.									
4.									
5.									
6.									
7.									
8.									
9.									
10.									
11.									
12.									
13.									
14.									
15.									
16.									
17.									
18.									
19.									
20.									
21.									
22.									
23.									
24.									
25.									
26.									
27.									
28.									
29.									
30.									
31.									
32.									

Key: G = Gas, S = Solid, L = Liquid, E = Element, C = Compound, and M =Mixture

Rotation Lab on Elements, Compounds and Mixtures

ANSWER KEY

	Name of Substance	Symbol or formula	Color	Phase (Check one)			Type (Check One)		
				S	L	G	E	M	C
1.	Copper	Cu	Orange	X			X		
2.	Steel	?	Silver/Black	X				X	
3.	Sodium Bicarbonate	NaHCO ₃	White	X					X
4.	Tin	Sn	Silver	X			X		
5.	Calgon	?	White	X				X	
6.	Aluminum	Al	Silver	X			X		
7.	Manganese dioxide	MnO ₂	Black	X					X
8.	Magnesium	Mg	Silver/Black	X			X		
9.	Copper Oxide	CuO	Black	X					X
10.	Pepper	?	Black/Brown	X				X	
11.	Charcoal	C	Black	X			X		
12.	Chalk	CaCO ₃	White	X					X
13.	Aqueous Ammonia (5%)	NH ₃ in H ₂ O	Clear		X			X	*
14.	Vinegar (5% Acetic Acid)	CH ₃ COOH in H ₂ O	Clear		X			X	*
15.	Sand (Silicon Dioxide)	SiO ₂	Beige	X					X
16.	Epsom Salts	MgSO ₄	White	X					X
17.	Zinc	Zn	Silver	X			X		
18.	Soil	?	Brown	X				X	
19.	Sugar (Sucrose)	C ₁₂ H ₂₂ O ₁₁	White	X					X
20.	Cobalt	Co	Gray	X			X		
21.	Nickel	Ni	Silver	X			X		
22.	Cream of Tartar	KHC ₄ H ₄ O ₆	White	X					X
23.	Table Salt (Sodium Chloride)	NaCl	White	X					X
24.	Sulfur	S	Greenish/yellow	X			X		
25.	Water	H ₂ O	Clear		X				X
26.	Iron	Fe	Brown/Black	X			X		
27.	Air	?	None			X		X	
28.	Cobalt Chloride	CoCl ₂	Maroon	X					X
29.	Copper Chloride	CuCl ₂	Turquoise	X					X
30.	Honey	?	Amber		X			X	
31.	Copper Sulfate	CuSO ₄	Blue	X					X
32.	Potassium Chromate	K ₂ CrO ₄	Yellow	X					X

Key: G = Gas, S = Solid, L = Liquid, E = Element, C = Compound, and M =Mixture

*Both 13 and 14 are solutions of compounds in water – therefore, they are mixtures. Most students will list these as compounds. Explain that solutions of compounds in water are mixtures.

1.

Name: Copper

Atomic Mass: 63.546 g/mol

Chemical Symbol or Formula
Cu

2.

Name: Steel

Atomic Mass: ?

Chemical Symbol or Formula
?

3.

Name: Sodium Bicarbonate

Atomic Mass: 84.01 g/mol

Chemical Symbol or Formula
NaHCO₃

4.

Name: Tin

Atomic Mass: 118.710 g/mol

Chemical Symbol or Formula
Sn

5.

Name: Calgon

Atomic Mass: 252.07 g/mol

Chemical Symbol or Formula
?

6.

Name: Aluminum

Atomic Mass: 26.98 g/mol

Chemical Symbol or Formula
Al

7.

Name: Manganese dioxide

Color Black
Solid

Atomic Mass: 86.94 g/mol

Chemical Symbol or Formula
 MnO_2

8.

Name: Magnesium

Atomic Mass: 24.305 g/mol

Chemical Symbol or Formula
Mg

9.

Name: Copper Oxide

Atomic Mass: 79.54 g/mol

Chemical Symbol or Formula

CuO

10.

Name: Pepper

Atomic Mass: ?

Chemical Symbol or Formula

?

11.

Name: Charcoal

Atomic Mass: 12.011 g/mol

Chemical Symbol or Formula

C

12.

Name: Chalk
(Calcium Carbonate)

Atomic Mass: 100.09 g/mol

Chemical Symbol or Formula

CaCO_3

13.

Name: Aqueous Ammonia

Atomic Mass: 35.05 g/mol

Chemical Symbol or Formula
 NH_3 dissolved in H_2O

14.

Name: Vinegar (5% Acetic Acid in water)

Atomic Mass: 60.05 g/mol

Chemical Symbol or Formula
 CH_3COOH dissolved in H_2O

15.

Name: Sand (Silicon Dioxide)

Atomic Mass: 60.09 g/mol

Chemical Symbol or Formula
 SiO_2

16.

Name: Epsom Salts

Atomic Mass: 120.37 g/mol

Chemical Symbol or Formula
 MgSO_4

17.

Name: Zinc

Atomic Mass: 65.39 g/mol

Chemical Symbol or Formula
 Zn

18.

Name: Soil

Atomic Mass: ?

Chemical Symbol or Formula
?

19.

Name: Sugar (Sucrose)

Atomic Mass: 180.16 g/mol

Chemical Symbol or Formula
 $\text{C}_{12}\text{H}_{22}\text{O}_{11}$

20.

Name: Cobalt

Atomic Mass: 58.9332 g/mol

Chemical Symbol or Formula
Co

21.

Name: Nickel

Atomic Mass: 58.69 g/mol

Chemical Symbol or Formula
Ni

22.

Name: Cream of Tartar

Atomic Mass: 187.170 g/mol

Chemical Symbol or Formula
 $\text{KHC}_4\text{H}_4\text{O}_6$

23.

Name: Table Salt
(Sodium chloride)

Atomic Mass: 58.44 g/mol

Chemical Symbol or Formula
NaCl

24.

Name: Sulfur

Atomic Mass: 32.066 g/mol

Chemical Symbol or Formula
S

25.

Name: Water

Atomic Mass: 18.00 g/mol

Chemical Symbol or Formula
H₂O

26.

Name: Iron

Atomic Mass: 55.847 g/mol

Chemical Symbol or Formula
Fe

27.

Name: Air

Atomic Mass: ?

Chemical Symbol or Formula
?

28.

Name: Cobalt chloride

Atomic Mass: 129.84 g/mol

Chemical Symbol or Formula
 CoCl_2

29.

Name: Copper chloride

Atomic Mass: 134.45

Chemical Symbol or Formula
 CuCl_2

30.

Name: Honey

Atomic Mass: 129.62 g/mol

Chemical Symbol or Formula

31.

Name: Copper Sulfate

Color Blue
Solid

Atomic Mass: 159.60 g/mol

Chemical Symbol or Formula
 CuSO_4

32.

Name: Potassium Chromate

Color Yellow

Solid

Atomic Mass: 194.20 g/mol

Chemical Symbol or Formula
 K_2CrO_4

33.

Name:

Atomic Mass:

Chemical Symbol or Formula